

# **Copper plumbing and the health of the Bay**

## **Guidelines for Plumbers**

San Francisco Bay is a delicately balanced ecosystem, home to many marine plants and animals. Copper, while naturally occurring, can upset the Bay's marine life when levels increase. Corrosion of copper plumbing pipes adds to amounts of copper in the Bay and is one of the more difficult sources to control.

Most regulatory standards have been based on toxicity to humans. Copper in the quantities typically contributed by pipe corrosion is not generally understood to be hazardous. However, San Francisco Bay's water quality standards are based on toxicity to aquatic life, which occurs at much lower levels.

### **What's being done about Copper in the Bay?**

Many of the Bay Area's city, county, and regional agencies - including wastewater treatment plants and stormwater management programs - are focusing pollution prevention efforts on keeping copper and other metals from reaching the Bay. Industry, the business community, and local governments are working cooperatively to reduce or eliminate many sources of copper and other metals to the Bay.

### **What contributes to corrosion of copper piping?**

Two factors that contribute to corrosion of copper piping are corrosivity of our water supply and design and installation practices for copper plumbing. The Santa Clara Valley Water District adds a corrosion inhibitor to the potable surface water supply, and the San Francisco Water District adjusts the pH of Hetch Hetchy water to make it less corrosive. However, these measures are not enough.

### **How can plumbers and plumbing contractors help?**

Corrosion of copper plumbing pipes contributes the largest share of the copper in sanitary sewage. There are a number of common practices plumbers can use when working with copper piping that will reduce the potential for corrosion. Following the International Association of Plumbing and Mechanical Officials (IAPMO) Installation Standards for Copper Plumbing Tube, Pipe and Fittings is a first step.

In addition to protecting the Bay, an obvious side benefit of reducing pipe corrosion is that plumbing is less likely to leak, has a longer life, and therefore has greater value for the customer.

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## **Plumbing Practices for a Healthy Bay**

### **Pipe quality assurance**

- Inspect interior pipe walls for:
  - Cleanliness (Residual oils from the manufacturing process can accelerate corrosion.)
  - Burrs and imperfections
- Return pipes with flaws to the manufacturer.
- Ream pipes carefully to remove all burrs. Eliminating burrs reduces turbulence and corrosion of copper piping systems.

### **Fluxing**

- Choose one of the less aggressive fluxes that meets the American Society of Test Materials standard (ASTM B813), as noted on the label. Less aggressive fluxes are less corrosive.
- Be careful not to apply more flux than you need to make the joint. Long after piping has been installed, residual flux can cause pitting or leaks.

### **Soldering**

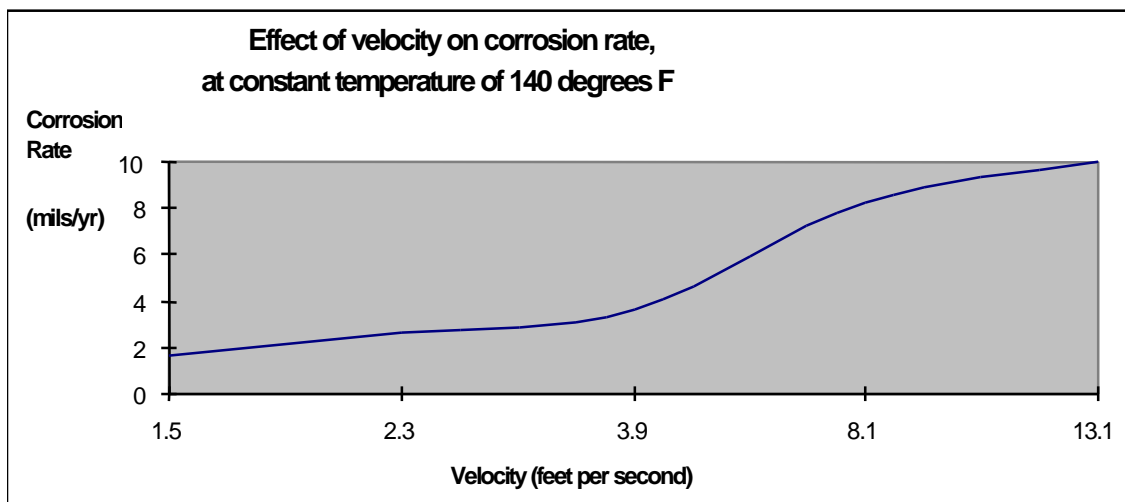
- Be sure to make a clean joint. When excess solder enters the pipe, it increases corrosion. The cleaner and smaller the soldering area, the less corrosion and the longer the life of the plumbing.
- Using solders with the widest available working (pasting) temperature range makes it easier to make cleaner joints and avoids wasting solder. Recently developed composite solders have a pasting range of as much as 200°F, as opposed to only 120°F for tin/antimony or silver solder.
- Wide-range solders that meet ASTM B32-93 standards (pasting range of at least 160°F) are grades E, HB, HN, and TC.

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## Plumbing Practices for a Healthy Bay

### Limiting pipe velocity

As the chart below shows, larger-bore pipes yield slower velocities that reduce copper corrosion.



Note: This example is based on characteristics of a specific water supply. Results will vary with different water sources.

On the basis of information from IAPMO and the American Water Works Association Research Foundation, we recommend limiting velocities in copper piping to:

Cold water plumbing 5 feet per second (fps)

Hot water piping 4 fps

Circulating hot water 3 fps

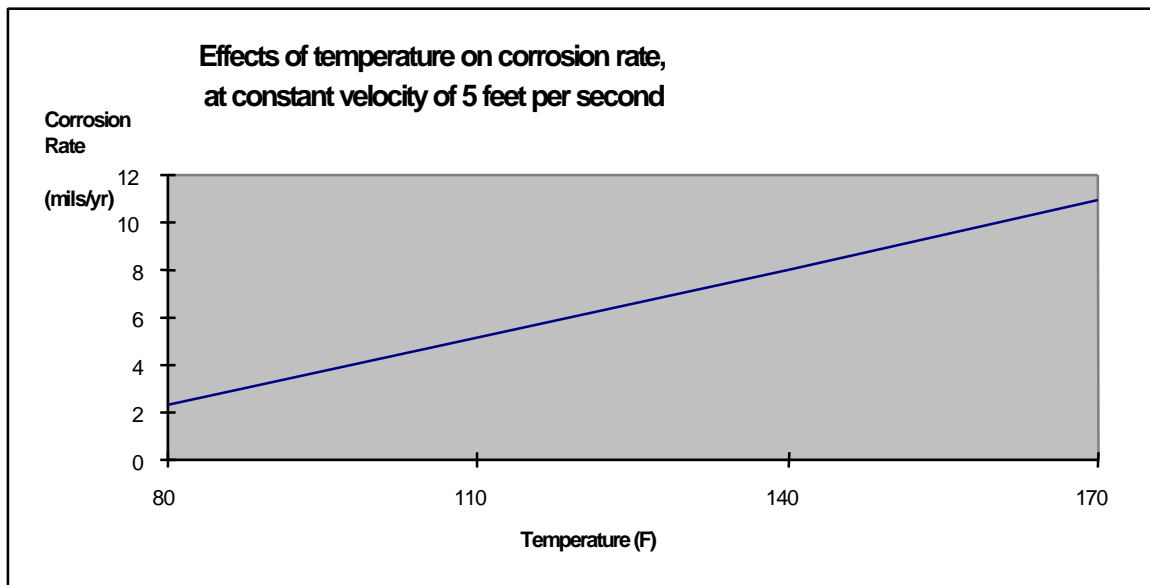
Keeping velocities low in circulating hot water systems is particularly important because the combination of high temperature and constant movement of the water accelerates corrosion and pipe failure. With lower velocities, the customer will not notice any difference in water delivery at the tap or showerhead. The relatively small additional cost associated with larger piping (required to maintain lower velocities) will easily be offset by the significantly longer life of the system. Quieter plumbing is an additional advantage of larger piping.

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## Plumbing Practices for a Healthy Bay

### Set hot water temperatures at recommended levels

Encourage customers to prolong the life of their plumbing system by setting and maintaining water heaters at recommended temperatures. Hotter water increases the corrosion rate and hastens failure.



Note: This example is based on characteristics of a specific water supply. Results will vary with different water sources.

### New construction considerations

Flush new piping thoroughly and as soon as possible after water is admitted to the system. Dirt, excess flux, and metal particles can initiate pitting.

Bay Area consumers have made it clear that they are concerned about environmental values and the health of San Francisco Bay, an irreplaceable local natural resource. Let your customers know that the special care you take to reduce the corrosion potential of their plumbing systems protects the Bay as well as their investment!

*If you have questions about pipe installation  
in your area, call your local building department.*